

## CORRIGENDA.

MONTHLY WEATHER REVIEW for August, 1901, page 362 column 1, line 3 from bottom, for

$$p = \left( \frac{1 + \varepsilon_1}{1 + \varepsilon_2} \right), \text{ read } p = \left( \frac{1 + \varepsilon_1}{1 + \varepsilon_3} \right)^m.$$

Page 363, column 1, dele all of line 20 after "curves." and all of line 21, and insert the following in its place:

"In connection with the spectral energy-curves shown in fig. 1, the circles indicate Langley's Lone Pine high-sun observations, August 11, 12, and 14, 1881, and values outside the atmosphere computed from the same. The crosses indicate Mount Whitney observations, September 1, 2, and 3, 1881, and outside values computed by formulæ R and D. Maxima are shown at the following points:" (See fig. 1 on preceding page.)

## THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Professor of Meteorology.

## CHARACTERISTICS OF THE WEATHER FOR DECEMBER.

The month of December, 1901, was characterized by heavy rainfall in the eastern and southern sections and by abnormally cold weather in the central and southern districts. A severe cold wave swept across the country from west to east on the 13th, 14th, and 15th. The cold wave was preceded in the Middle Atlantic and New England States by heavy rains and more or less destructive floods. A second period of heavy rain set in toward the end of the month, causing a number of rivers in the Middle and South Atlantic States to pass beyond the flood stage. The weather on the Pacific coast was cloudy and rainy during the first ten days of the month; thereafter, generally fair weather prevailed especially in California and the central and southern Plateau region.

## PRESSURE.

The distribution of monthly mean pressure is graphically shown on Chart IV and the numerical values are given in Tables I and VI.

Pressure was below the normal in all portions of the country, except the north Pacific coast, the northern Plateau, and thence southeastward and southward to the Mexican boundary and western Texas. The high over the South Atlantic States was perceptibly weaker than usual although the high over the ocean seemed to be fairly strong. Monthly mean pressure, as compared with the previous month, fell in the interior of the country and rose on the New England coast, also from the Rocky Mountains westward to the Pacific

## TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

The month was colder than usual in the interior of the country, the South Atlantic States, and Florida. West of the Rocky Mountains and over the northeastern Rocky Mountain slope mean temperature ranged from 3° to 7° above the normal. Temperature was also above the normal in northeastern New England and over the Canadian Maritime Provinces. The greatest negative departures were in the lower Ohio and middle Mississippi valleys, where monthly mean temperature was as much as 6° below the seasonal average. Maximum temperatures of 80° and over were registered only in Texas, southern Louisiana, southern Florida, southwestern Arizona, and southern California. In the upper Lake region and north-

ern Minnesota the maximum temperature of the month did not at any time exceed 40°. Minimum temperatures of zero and lower were registered over the greater part of the central and northern districts, and freezing temperatures prevailed to the Gulf coast and over the peninsula of Florida as far south as Tampa.

The average temperature for the several geographic districts and the departures from the normal values are shown in the following table:

*Average temperatures and departures from the normal.*

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
New England .....	10	30.8	+ 0.4	- 1.9	- 0.2
Middle Atlantic .....	12	34.6	- 1.7	- 4.1	- 0.3
South Atlantic .....	10	45.8	- 2.8	- 17.0	- 1.4
Florida Peninsula .....	7	58.3	- 3.0	- 20.3	- 1.7
East Gulf .....	7	47.4	- 4.9	- 15.4	- 1.3
West Gulf .....	7	47.7	- 8.7	+ 7.7	+ 0.6
Ohio Valley and Tennessee .....	12	32.7	- 5.4	- 10.1	- 0.8
Lower Lake .....	8	37.4	- 8.1	- 2.0	- 0.2
Upper Lake .....	9	31.6	- 2.9	+ 11.1	+ 0.9
North Dakota .....	8	12.4	- 0.3	- 25.5	+ 2.1
Upper Mississippi Valley .....	11	23.3	- 5.1	+ 14.9	+ 1.2
Missouri Valley .....	10	24.6	- 4.7	- 23.3	+ 2.4
Northern Slope .....	7	25.9	+ 1.3	- 23.3	+ 2.4
Middle Slope .....	6	32.8	- 2.0	- 20.9	+ 1.7
Southern Slope .....	6	39.9	- 1.8	+ 14.0	+ 1.2
Southern Plateau .....	15	39.8	+ 1.4	+ 9.5	+ 0.8
Middle Plateau .....	9	30.0	+ 3.2	+ 19.5	+ 1.6
Northern Plateau .....	10	32.0	+ 1.5	+ 20.8	+ 1.7
North Pacific .....	9	41.5	- 0.3	- 1.1	- 0.1
Middle Pacific .....	5	49.8	+ 1.2	+ 2.1	+ 0.2
South Pacific .....	4	54.6	+ 1.8	+ 6.3	+ 0.5

In Canada Prof. R. F. Stupart says:

The extreme western and southwestern counties of the Province of Ontario were the only portions of the Dominion where the mean temperature of the month was below average, the greatest departure, about 5°, being in Essex. Near the shores of Lake Ontario and the Georgian Bay the mean was nearly average, and thence northward and eastward a positive departure increased to 3° or 4° in the Ottawa Valley and western Quebec and to 6° in eastern Quebec. In Nova Scotia and Prince Edward Island the average was exceeded by between 3° and 6°; in Manitoba and Assiniboia by nearly the same amount, while further northward and westward in the Territories, in Saskatchewan and Alberta, the positive departure from average was from 6° to 9°. In British Columbia a positive departure of 3° near the Selkirk range diminished gradually toward the coast.

## PRECIPITATION.

On the whole the month was one of abundant rainfall. More than 100 per cent of the normal precipitation was recorded in ten of the twenty-one districts into which the country has been divided, and in five others more than 75 per cent of the normal was registered. The greatest positive departures occurred in the eastern section and extended over a considerable belt of country between Mississippi on the southwest and New England on the northeast. In Texas and

on the Pacific coast, and also on the Plateau region, precipitation was below the seasonal average. There were also small regions of deficient precipitation in northern Florida, southeastern Georgia, the upper Mississippi Valley, and the upper Lake region. The total rainfall for the month over a considerable portion of eastern Alabama, northwestern Georgia, eastern Tennessee, southwestern Mississippi, and eastern Louisiana was above 10 inches.

*Average precipitation and departure from the normal.*

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		<i>Inches.</i>		<i>Inches.</i>	<i>Inches.</i>
New England .....	10	7.38	198	+3.6	+0.8
Middle Atlantic .....	12	5.84	180	+2.6	+1.3
South Atlantic .....	10	4.27	180	+0.7	+2.0
Florida Peninsula .....	7	2.93	118	+0.4	+1.3
East Gulf .....	7	6.98	159	+2.6	+0.5
West Gulf .....	7	2.47	75	-0.8	-11.3
Ohio Valley and Tennessee .....	12	5.17	145	+1.6	+9.5
Lower Lake .....	8	4.28	149	+1.4	+1.9
Upper Lake .....	8	1.63	73	-0.5	-6.8
North Dakota .....	8	0.87	120	+0.2	+1.3
Upper Mississippi Valley .....	11	1.70	85	-0.3	-10.2
Missouri Valley .....	7	1.32	118	+0.2	+5.1
Northern Slope .....	6	1.01	198	+0.5	+1.5
Middle Slope .....	6	0.52	87	-0.4	-6.0
Southern Slope .....	15	0.56	38	-0.9	-4.4
Southern Plateau .....	9	0.22	17	-1.1	-0.1
Middle Plateau .....	10	1.17	85	-0.2	-0.3
Northern Plateau .....	9	1.76	95	-2.1	-2.3
North Pacific .....	5	6.77	39	-3.1	-0.5
Middle Pacific .....	5	1.86	33	-3.8	-2.6
South Pacific .....	4	0.08	2	-8.2	-1.1

**In Canada Professor Stupart says:**

The precipitation was less than average in British Columbia, over the greater part of Manitoba, and also over portions of Quebec and northern Ontario. In all other parts of the Dominion it was greater than average, the most marked excess being in Nova Scotia.

At the close of the month the lower levels in British Columbia, the larger part of Alberta, and the western portions of Assiniboia were bare of snow, as were also Nova Scotia and Prince Edward Island and the southern part of New Brunswick. From Assiniboia eastward over Manitoba, Ontario, Quebec, and northern New Brunswick, the ground was snow-covered, the greatest depth reported being between 16 and 20 inches in Quebec and northern Ontario.

The southern limit of snow extended well to the southward. It did not embrace, however, southern Georgia, southern Alabama, nor southern Texas. No snow fell on the lowlands of Arizona or California. The geographic distribution of snowfall for the month is shown by Chart IX. At the end of the month a light covering of snow was on the ground in eastern Tennessee, eastern Kentucky, northern Ohio, and thence westward to the middle Missouri Valley. The covering of snow in Nebraska and South Dakota was local rather than general, a number of stations reporting an inch or thereabouts, while others reported none. The greatest depth of snow was found in New York, northern New England, northern Michigan, and in the mountain districts of the west. Very little snow appears to be on the ground on the western slope of the Rocky Mountains.

**SLEET.**

The following are the dates on which sleet fell in the respective States:

Alabama, 14, 19, 29, 30. Arizona, 10, 11, 12. Arkansas, 3, 4, 5, 8, 12, 13, 14. California, 3, 5, 9. Colorado, 4, 10, 11, 12, 19, 24. Connecticut, 3, 4, 23, 26, 27. District of Columbia, 23. Florida, 16, 17. Georgia, 5, 19, 23, 28, 30. Idaho, 5, 8, 26. Illinois, 8, 9, 12, 13, 14, 24, 28, 29. Indiana, 9, 11, 12, 13, 14, 23, 24, 29. Iowa, 1, 4, 5, 6, 7, 8, 10, 12, 13, 23, 26, 28. Kansas, 7, 8, 10, 11, 12, 13, 15, 27, 28. Kentucky, 9, 13, 14, 27. Louisiana, 13, 14, 15, 28, 29. Maine, 8, 9, 15. Maryland, 3, 10, 13, 14, 23, 25, 29. Massachusetts, 3, 4, 24, 25, 27.

Michigan, 7, 8, 12, 13, 24, 29. Minnesota, 1, 2, 6, 27, 28. Mississippi, 4, 5, 13, 14, 15, 29. Missouri, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 19, 26, 28, 30. Montana, 4, 23. Nebraska, 4, 5, 7, 12, 23, 27. Nevada, 10. New Hampshire, 3, 8, 15. New Jersey, 2, 3, 4, 23, 27. New York, 2, 3, 8, 9, 14, 28, 29. North Carolina, 5, 16, 17, 23, 24. North Dakota, 1, 22, 23, 26. Ohio, 14, 28, 29. Oklahoma, 8, 13. Oregon, 3, 9, 25, 26. Pennsylvania, 3, 9, 14, 15, 23, 25, 26, 27, 28, 29. South Carolina, 5, 19, 22, 23. South Dakota, 2, 3, 4, 22, 23. Tennessee, 10, 14, 15, 22, 30. Texas, 8, 12, 13, 14, 15, 28. Utah, 6, 10, 11. Virginia, 8, 23, 28, 29, 30. Washington, 4, 8, 17, 20, 21, 22, 23, 26. West Virginia, 14, 28, 29. Wisconsin, 8, 12, 13, 28. Wyoming, 2, 8, 24.

**HAIL.**

The following are the dates on which hail fell in the respective States:

Alabama, 2. Arkansas, 1, 4, 9. California, 11, 12. Kansas, 13. Maine, 15. Missouri, 13. Texas, 8, 13, 28.

**HUMIDITY.**

The averages by districts appear in the subjoined table:

*Average relative humidity and departures from the normal.*

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England .....	79	+4	Missouri Valley .....	79	+4
Middle Atlantic .....	78	+4	Northern Slope .....	77	+10
South Atlantic .....	78	+1	Middle Slope .....	70	+5
Florida Peninsula .....	88	+1	Southern Slope .....	61	-6
East Gulf .....	77	-1	Southern Plateau .....	37	-11
West Gulf .....	71	-2	Middle Plateau .....	64	-3
Ohio Valley and Tennessee .....	81	+6	Northern Plateau .....	80	-1
Lower Lake .....	82	+4	North Pacific Coast .....	88	0
Upper Lake .....	84	+3	Middle Pacific Coast .....	71	-13
North Dakota .....	81	+2	South Pacific Coast .....	60	-14
Upper Mississippi .....	83	+6			

**SUNSHINE AND CLOUDINESS.**

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

*Average cloudiness and departures from the normal.*

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England .....	6.4	+0.6	Missouri Valley .....	5.7	+0.6
Middle Atlantic .....	5.9	+0.5	Northern Slope .....	5.6	+1.0
South Atlantic .....	5.1	+0.4	Middle Slope .....	4.6	+0.6
Florida Peninsula .....	4.9	+0.3	Southern Slope .....	3.6	-0.8
East Gulf .....	5.8	+0.8	Southern Plateau .....	2.0	-1.0
West Gulf .....	4.2	-1.1	Middle Plateau .....	4.8	-0.8
Ohio Valley and Tennessee .....	6.7	+0.6	Northern Plateau .....	6.6	+0.5
Lower Lake .....	7.5	-0.1	North Pacific Coast .....	7.6	+0.3
Upper Lake .....	7.6	+0.5	Middle Pacific Coast .....	3.3	-2.1
North Dakota .....	6.3	+1.1	South Pacific Coast .....	2.7	-1.7
Upper Mississippi .....	6.5	+0.8			

**WIND.**

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which

also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

*Maximum wind velocities.*

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Block Island, R. I.....	3	77	ne.	Mount Tamalpais, Cal.	9	50	nw.
Do.....	4	58	n.	Do.....	24	50	n.
Do.....	15	52	nw.	Do.....	25	55	n.
Buffalo, N. Y.....	10	54	sw.	Do.....	27	52	n.
Do.....	14	54	s.	Nantucket, Mass.....	4	54	ne.
Do.....	31	51	w.	Neah Bay, Wash.....	3	56	e.
Carson City, Nev.....	5	50	sw.	Do.....	4	52	w.
Cheyenne, Wyo.....	28	66	w.	Do.....	26	60	w.
Chicago, Ill.....	31	54	nw.	New York, N. Y.....	4	65	nw.
Denver, Colo.....	18	52	n.	Do.....	10	60	w.
El Paso, Tex.....	12	52	w.	Do.....	11	65	nw.
Helena, Mont.....	21	55	sw.	Do.....	27	50	nw.
Do.....	26	56	sw.	Do.....	31	66	nw.
Lexington, Ky.....	18	50	s.	Pensacola, Fla.....	28	60	sw.
Modena, Utah.....	6	54	sw.	Point Reyes Light, Cal.	23	60	nw.
Mount Tamalpais, Cal..	3	60	w.	Portland, Me.....	15	58	se.
Do.....	5	56	w.	Salt Lake City, Utah..	26	50	nw.
Do.....	6	55	nw.	Winnemucca, Nev.....	5	70	s.

### ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

*Thunderstorms.*—Reports of 336 thunderstorms were received during the current month as against 261 in 1900 and 353 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 13th, 112; 14th, 35; 12th, 34; 8th, 32.

Reports were most numerous from: Louisiana, 38; Missouri, 36; Arkansas and Texas, 32.

*Auroras.*—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 21st to 29th.

*In Canada:* Auroras were reported at Swift Current on the 7th, and 19th. A thunderstorm was reported from New Westminster on the 3d.

### DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Professor of Meteorology.

Table I gives, for about 145 Weather Bureau stations making two observations daily and for about 25 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (....).

Table III gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table IV gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table V gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes..	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates pr. hr. (ins.)..	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the

colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table VI gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table VII gives the heights of rivers referred to zeros of gages.

### NOTES EXPLANATORY OF THE CHARTS.

Chart I, tracks of centers of high areas, and Chart II, tracks of centers of low areas, are constructed in the same way. The roman numerals show number and chronological order of highs (Chart I) and lows (Chart II). The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. Within each circle is also given (Chart I) the highest barometric reading and (Chart II) the lowest pressure at or near the center at that time.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level pressure, temperature, and resultant surface winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p. m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and are reduced to sea level and to standard gravity. The reduction for 30 inches of the mercurial barometer, as formerly shown by the marginal figures for each degree of latitude, has already been applied.